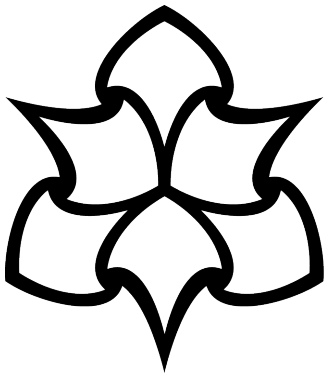

UK and the European Union: exports of car components from 1994 to 2016

John Simister

Abstract

The UK has become increasingly reliant on international trade, especially with other European Union countries. This paper investigates UK exports, focusing on components for making cars. Large (often multinational) corporations are central to the process of car manufacture; such firms often operate across national boundaries. The European Union appears to have helped the UK economy to develop, by providing access to large consumer markets for UK-based firms: many UK jobs rely (at least partly) on exports. This paper reports evidence on links between UK factories making car components, and factories in other EU countries which use such components to make cars – in particular, focusing on German, French, and Italian car manufacturers. Insights are provided into the 'Just-in-time' approach to production, which is popular in many industries. Employment data from UK government surveys shed light on some characteristics of employees in UK factories making car components.

Keywords: European Union; exports; value chain; cars; 'Just-in-time'.

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The UK 'Labour Force Survey' data analysed in this paper has been collected by the UK government; the data are made available to researchers by the UK Data Archive, and are used by the author with permission. Other data analysed in this paper are from the Eurostat and UNCTAD websites, and are publicly available. If any errors occur in this paper, the responsibility is with the author rather than organisations which collected the data (or made it available).

Introduction

The term 'globalisation' is often used to mean an increasing tendency for imports & exports to occur; other aspects of globalisation include international flows of money, and movement of people between countries. Some writers warn of a 'race to the bottom', in which multinational corporations seek to reduce their wage bills by locating production in countries such as China & India where wages tend to be lower than Europe (Demeny & McNicoll, 2006: 271): globalisation could be harmful in some respects, if it leads to increasing unemployment. This paper reports

evidence that globalisation can also create jobs. There are many benefits to UK from European Union (EU) membership, such as migration (Storey & Tether, 1998) and standardisation of products (European Commission, 2016). This paper investigates UK exports to other countries in the EU. Because of the complex nature of such exports, this paper focuses on the car industry as a case study. UK is well-known as a manufacturer and exporter of cars; but it may not be obvious that much of UK exports in the car industry are components, rather than finished cars. This paper concentrates on the export from UK of components for cars, which are then installed in cars manufactured in other EU countries. "In recent years, the UK has benefited from significant investments by many of the world's major vehicle manufacturers including BMW Group, Ford, Vauxhall, Jaguar Land Rover, Nissan and Toyota. This attests to the global nature and dynamism of this sector. The optimism that exists, however, is not limited to major manufacturers. The supply chain that feeds into these Original Equipment Manufacturers (OEMs) is also seeing demand increase with significant growth opportunities, helping the wider industry recover after a difficult few years" (KPMG, 2014).

This paper discusses several aspects of UK exports, including modern technologies and "Just-in-time" manufacturing. Central to such industrialisation is the need for highly-skilled staff in UK, such as engineers and scientists. It is vital for the UK economy that access to specialist staff continues; in addition to sophisticated science and engineering, UK appears to need some employees to be skilled in more than one European language.

Literature review

UK firms are increasingly linked to production in other EU countries, by business deals such as 'joint ventures'. This includes multinational firms, which operate in several countries; but also includes sales from UK-based companies to firms in other EU countries. An example is the European Airbus: aircraft wings are made in UK, for assembly in other EU countries (Prime Minister's Office, 2011). The extent to which a country specialises in exporting certain products is influenced by many factors, such as costs of transport (Springford & Whyte, 2014: 2). It seems appropriate for each country to make goods they can produce efficiently, to seek 'comparative advantage' (Timmer et al., 2014: 115). For example, a north European country such as UK has a comparative advantage in growing crops such as wheat; whereas farmers in southern Europe are more likely to make profits from crops such as lemons in Italy, or olives in Greece. Which types of food grow best in a particular location depends on factors such as temperature; rainfall; soil type; and altitude. It seems obvious that farming should vary from one country to another; but the reasons for particular types of industrial products being associated with a particular place are less clear (this may partly reflect the country in which a new product was invented).

International trade is increasingly important in Europe. EU is a focus for many managers wishing to export (Eyre & Smallman, 1998): "larger markets permit greater division of labor, stimulate competition, specialization, innovation, and higher productivity, and provide their participants with access to a greater variety of goods" (Demeny & McNicoll, 2006: 270). Average costs of manufacture tend to be lower in a big firm (compared to a small firm); these are called *internal* 'economies of scale' (Ganotakis & Love, 2012: 707) – for example, a large car factory could have specialist machines to spray cars with paint. The EU is big enough to gain economies of scale (Demeny & McNicoll, 2006: 275), so UK firms benefit from access to large markets in EU countries; this can be seen by use of several languages on packaging products (Thomas, 2011: 287). There are also *external* economies of scale, where a firm gains by other local manufacturers: for example, the Airbus Group of companies carries out much of their research in Britain because UK has about two thousand engineers who specialise in aircraft design, 3D printing, and innovative materials including composites (Austin-Morgan, 2016). KPMG (2014) report that "Tier 1 suppliers often cluster their assembly plants close to their OEM customers' production plants, in order to manage short term fluctuations in demand and meet customer requirements better. These Tier 1 suppliers and their own Tier 2 suppliers typically manufacture components within the region". However, "Less than 40% of the total spend in the UK supply chain is

currently sourced locally indicating a reliance on international suppliers, the majority of which are within the EU" (KPMG, 2014). Many firms benefit from "learning by exporting": by focusing on exports, a firm gains access to foreign expertise & technology (Ganotakis & Love, 2012). Exporting is simplified by standardisation in EU countries since 1992 – for example, there are now fewer differences in chemical composition of detergent product between EU countries, making it easier for UK firms to produce and export washing powders to many other EU countries (Thomas, 2011: 288).

There is an increasing pattern for high-technology production in rich countries, based on high-skilled labour, using capital-intensive production methods; these include agriculture, manufacturing, and services (Timmer et al., 2014: 100). This may be associated with the 'Just-in-time' or 'flexible specialisation' approach to industry, considered by many writers as a replacement to the 'Fordist' production popular in recent decades (O'Mahony & Robinson, 2003: 72). In the Just-in-time approach, a manufacturer of a complex product such as a car will buy ready-made components, and assemble them into a finished product; this offers great flexibility – for example, it allows a car manufacturer to tailor the colour, engine size, and type of car seat to the preferences of an individual customer. It requires a manufacturer to identify the best supplier of components (Sarı, Baynal & Ergül, 2016). Needham (2013: 2) describes the EU car industry as a pyramid structure, with a few car manufacturers, and a larger number of firms supplying these car-making firms: "The manufacturer designs and assembles the car. First-tier suppliers manufacture and supply main components (e.g. the fuel pump), while second-tier suppliers produce simpler individual components (e.g. the housing of a fuel pump). Third and fourth-tier suppliers provide raw materials" (Needham, 2013: 3). This quote may oversimplify the problems faced by car firms, sometimes dismissed as "badge engineering" – globally, and in EU, cars are a competitive market. This is a contest which UK seems to be winning: for example, "Nissan manufactured over 500,000 cars at its Sunderland plant in 2013. 19% of production was sold domestically in the UK, 71% was exported to the rest of Europe (including Russia) and 10% exported to the rest of the world" (KPMG, 2014).

Production is becoming more international: "gross exports of each country are produced using a convex combination of domestic and foreign technologies" (Johnson, 2014: 139). The terms 'snakes' and 'spiders' are sometimes used: "Snakes involve a sequence in which intermediate goods are sent from country A to B, and incorporated into intermediate goods sent from B to C, and so on until they reach the final stage of production. Spiders involve multiple parts coming together from a number of destinations to a single location for assembly of a new component or final product" (Timmer et al., 2014: 101). Trade barriers, such as taxing of imports, discourage trade between countries (Johnson, 2014: 135); the EU has reduced such barriers dramatically in recent decades. "The European Commission is responsible for EU legislation on motor vehicles, providing rules for safety and environmental protection, as well as the conditions under which vehicles can be put on the EU market" (European Commission, 2016).

A Eurostat investigation in 2009 found that about 30 to 40% of employees in the EU car industry are highly-skilled and trained professionals or technicians (Needham, 2013: 2), and that the car industry is an important source of jobs and export revenue for the EU. Hence, there would be causes for concern in the car industry if the UK were to leave the EU (in 2016, or in any other referendum which might be called in future). KPMG (2014) describe an example of vehicle design in stages: engine design in UK; vehicle engineering in Germany; engine manufacture in UK, Germany, Spain & Romania; and car production in Spain, Germany, Romania, Turkey, & Germany.

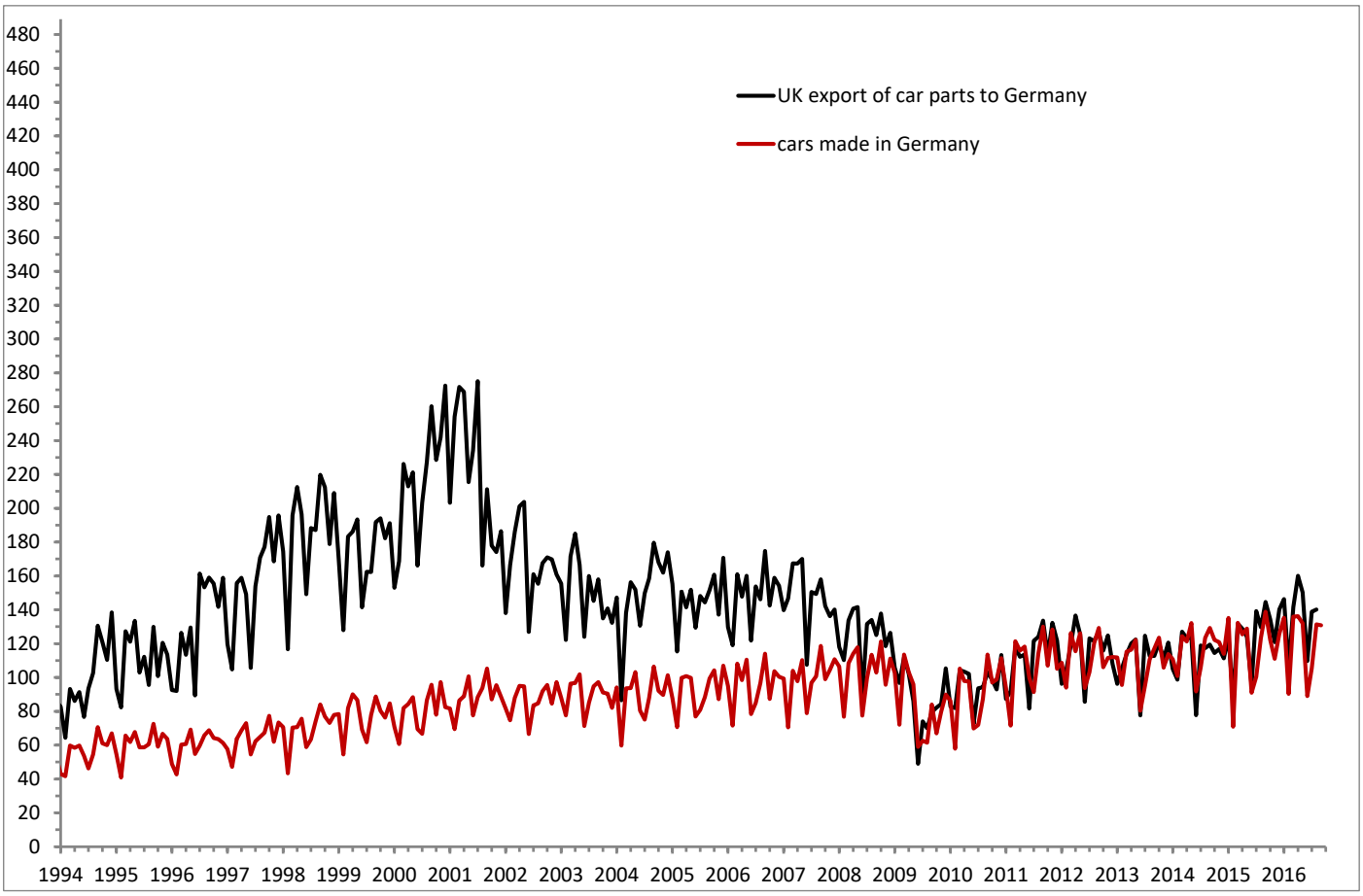
Research and Development (R&D) refers to research spending – including product innovation, process innovation & organizational innovation (Martin & Nguyen-Thi, 2015: 1107-8). A large fraction of R&D in the EU is associated with the car industry (Needham, 2013); some R&D is paid for, or subsidised by, governments or EU institutions (Nugent, 2003: 316-8).

UK exports of car parts

The following three charts are reported to assess if there are links between UK exports, and car production in other EU countries. For this paper, three case study countries are chosen; Germany, France, and Italy. If there appear to be links between UK-made car components and car manufacture in those three countries, this may be part of a more general pattern (note, however, that there is not enough space in this paper to consider all available evidence).

Chart 1 shows an index representing the number of cars manufactured in Germany each month, from Eurostat (2016a): Eurostat converted the data into an index, to average 100 in the 12 months of 2010. The second line in Chart 1 shows the value of UK exports of car parts (SITC 784) in Euros, from Eurostat (2016b); data are sent to Eurostat in current prices, but are converted by Eurostat to constant prices: "Intra- and extra-EU trade statistics are used at their most detailed level — eight-digit CN subheadings by partner country — for calculating indices" (Eurostat, 2015: 28). For comparability with Eurostat (2016a), the author converted export values into an index where the values for 2010 average to 100. None of the data in this paper have been adjusted for seasonal variation.

Chart 1: UK car parts exported to Germany and German car manufacture (Euros), by month



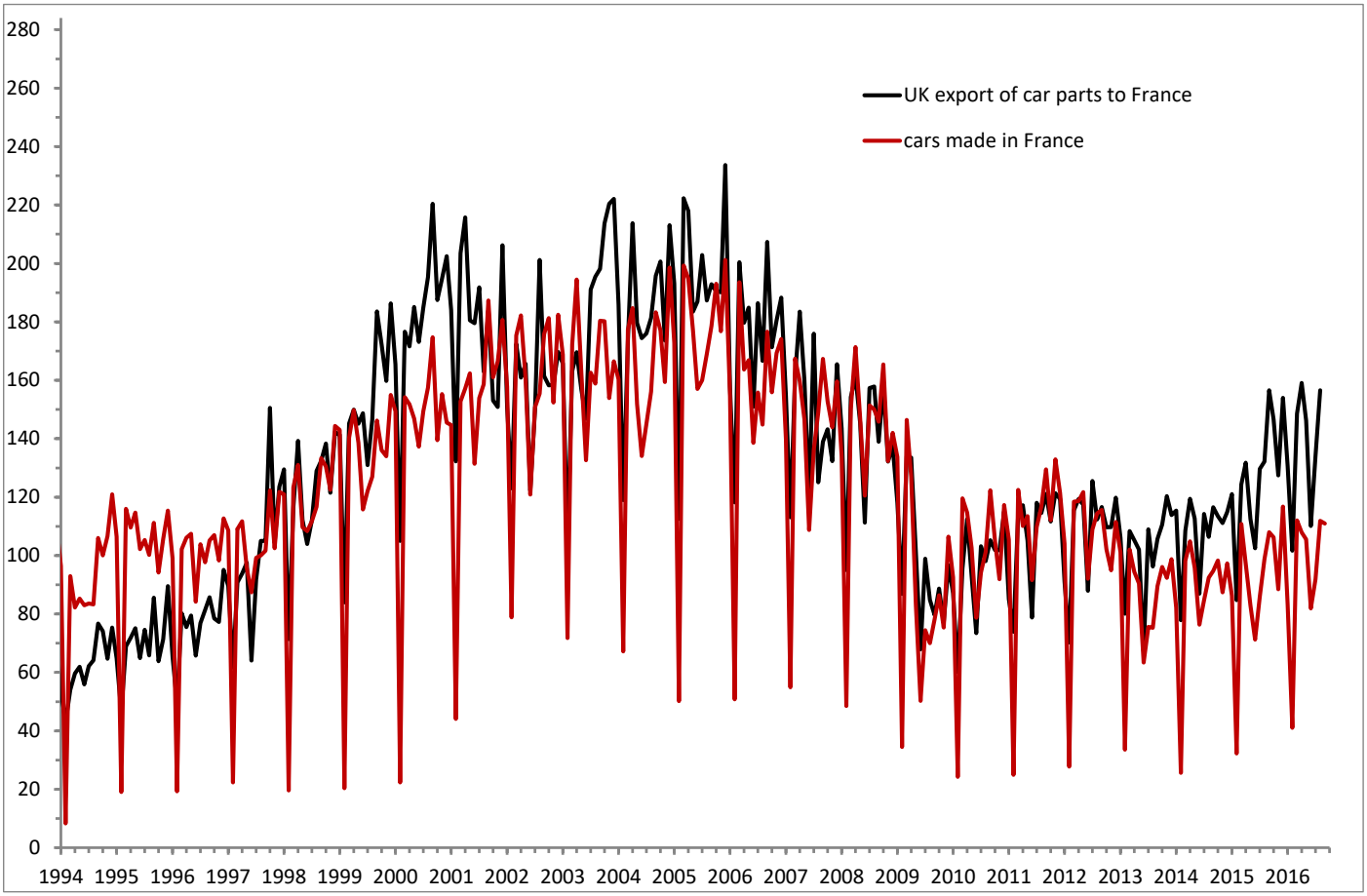
Source: Eurostat (2016b): author's analysis

The red line in Chart 1 shows a fairly steady increase in the number of cars made in Germany from 1994 to 2016, except for a dip around 2009 (this dip is likely to be a result of the global financial crisis around 2008). The black line in Chart 1 shows the value of car components exported from UK to Germany, in constant Euros. From 2009, the right-hand-side of Chart 1 shows a remarkably close match between German imports of UK car components, and German car production. This pattern can be seen as two different factors: one factor is a strong seasonal pattern, in

which both lines vary from month to month (the author's analysis of German data from 2011 to 2015, not reported in this paper, shows car production was generally highest in October and lowest in December). The second factor is year-to-year variation: for example, the red and black lines both tend to rise from 2009 to 2012, then fall slightly to 2014, before rising again (the latest data available, at the time of writing, are February 2016 for car parts imports, and March 2016 for car production).

The previous paragraph suggests UK car components are associated with German car manufacture, from 2009. However, the situation before 2009 is less clear: the black line (UK car parts) is far above the red line (cars made in Germany); the greatest divergence between the two lines is around 2001. There are various possible reasons for such a divergence: perhaps more UK car parts were bought around 2001 – for example, variations in exchange rates could affect the volume of trade between UK and Germany. Using annual data from UNCTAD (2016), the exchange rate rose from 1.27 Euros per £ in 1994, to a peak of 1.64 Euros per £ in 2000, then fell to 1.38 Euros per £ in 2015; this suggests UK exports became more expensive (not less expensive) around 2000, which makes the £ - Euro exchange rate seem an unconvincing explanation for the divergence between the two lines in Chart 1. The possible influence of exchange rates is discussed further below, along with other comments on the relationship between the two lines on Chart 1. A key issue in Chart 1 is the seasonality in car components: if (for example) German car makers simply want to buy UK-made car engines, why not buy them steadily through the year? Alternatively, a reader might suppose Germany car firms can predict their sales so accurately that they can tell UK factories in advance how many car engines to make; but researchers report this is not the way most European cars are manufactured – in practice, a consumer can decide (at the time of purchase) several details of the car.

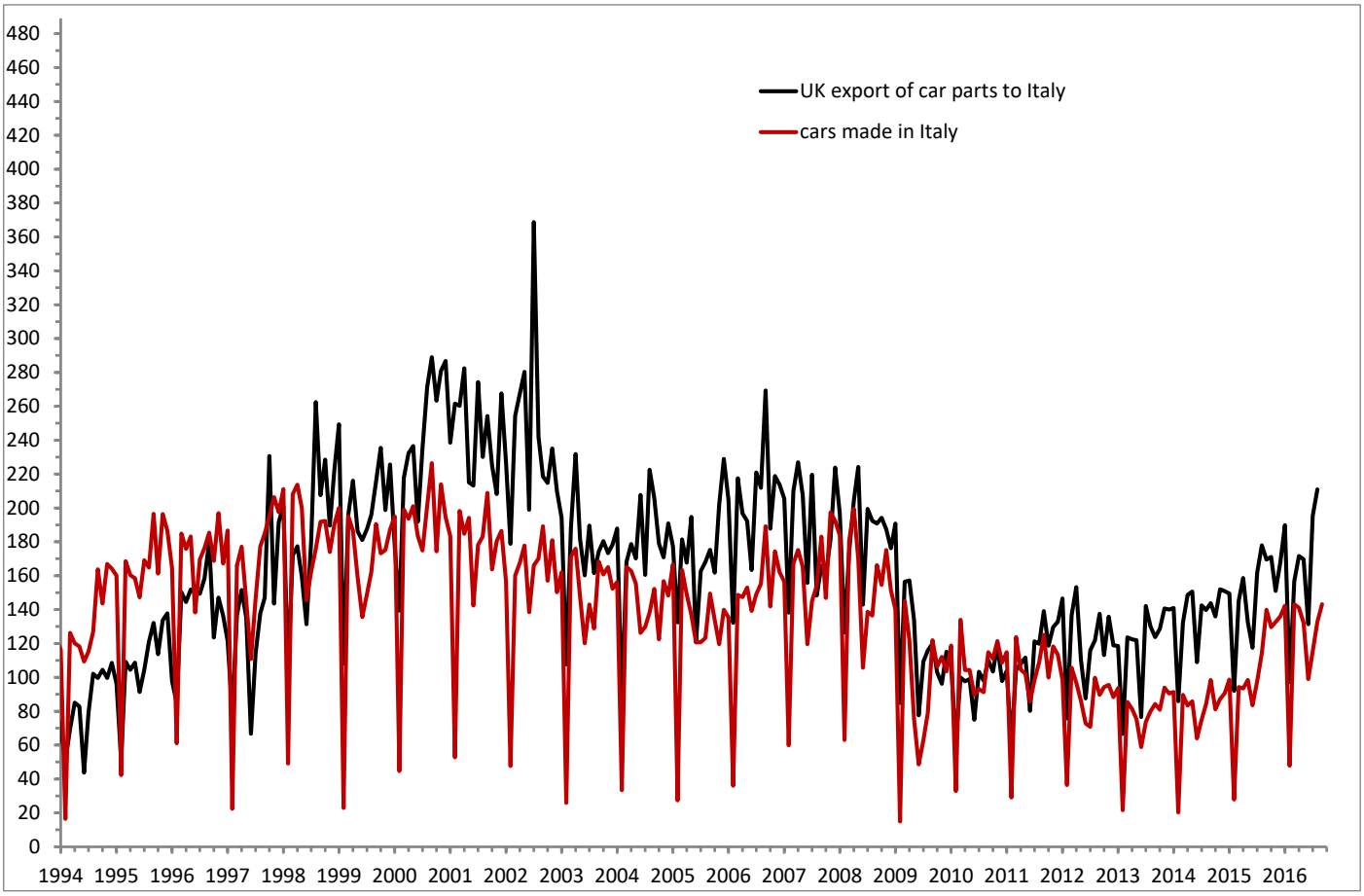
Chart 2: UK car parts exported to France and French car manufacture (Euros), by month



Source: Eurostat (2016b): author's analysis

Chart 2 uses the same data sources and methods as Chart 1, for France. Chart 2 shows a very striking seasonal pattern in car production: in each year, August is the month with the lowest output, shown by a downward-pointing 'spike' in the red line each year. There is also a matching downward spike in the black line in August. The red and black lines also have broadly similar trends: rising from 1994 to about 2006, then falling to 2009, followed by an increase to 2012, falling in 2013, then increasing again. Hence, there seems to be a fairly close connection between French car manufacturing, and French imports of car components from UK. The significance of this apparent link is discussed below, after Chart 3. Chart 2, like Chart 1, confirms previous research (some of which is discussed above), which describes the European car industry as 'Just-in-time': rather than buying car components in bulk and then storing surplus items in a warehouse, it seems UK factories only export components in the month when they are about to be installed in a newly-built car.

Chart 3: UK car parts exported to Italy and Italian car manufacture (Euros), by month



Source: Eurostat (2016b): author's analysis

Chart 3 shows a persuasive link between UK car part exports to Italy, and the number of cars manufactured in Italy: the red and black lines have similar seasonal patterns (red and black lines both fall in August), and they have similar long-term trends (generally increasing from 1994 to about 2001, then falling to 2009, followed by a general rise to 2012, then falling to 2013, and rising since then). The following paragraph discusses how such similarities might be interpreted.

Considering Charts 1 to 3 together, there are some common themes. In Germany and France and Italy, the production of cars seems linked to the value of car parts imported (to that country) from UK. Seasonal patterns in each Chart suggest a short-term adjustment process, which is consistent with the 'Just in Time' approach to manufacturing, outlined in the literature review. We can dismiss the possibility that UK car parts are imported just to repair or improve second-hand cars: we would not see such a close match (especially in seasonal variation) unless UK components are used to make new cars.

Another pattern we can observe in Charts 1 to 3 is that (in each Chart) there was a noticeable divergence between the two lines around 2001; this pattern may be clarified by further research. In all three Charts, the closest association between the pair of lines is since 2009; this suggests UK car parts are increasingly becoming integral to car manufacture in these countries. Each car manufacturing firm seeks the best quality & value components, when making cars; the exchange-rate between the Euro and UK£ may play an important pattern: for example, if the £ rises relative to the Euro, this tends to make UK car parts more expensive for car manufacturers in Germany, France, and Italy (and other countries which use the Euro).

Eurostat (2016c) reports annual data on UK car components in considerable detail, from 1995 and 2014 (the author is not aware of such detailed data before 1994 or since 2014); monthly data is not reported in Eurostat (2016c). For this paper, the author selected six of the many types of car component reported by Eurostat (2016c) – they are displayed in Chart 4. As shown in the legend, the data series are categories 24413050 to 27202100. At the top of the legend, data series 24413050 (platinum, palladium, etc.) is included in Chart 4 because some of these elements are used as the basis of a catalytic converter – part of a car exhaust system (Amin & Rathod, 2012: 119).

Chart 4: UK exports of six types of car components to other EU countries, by year.

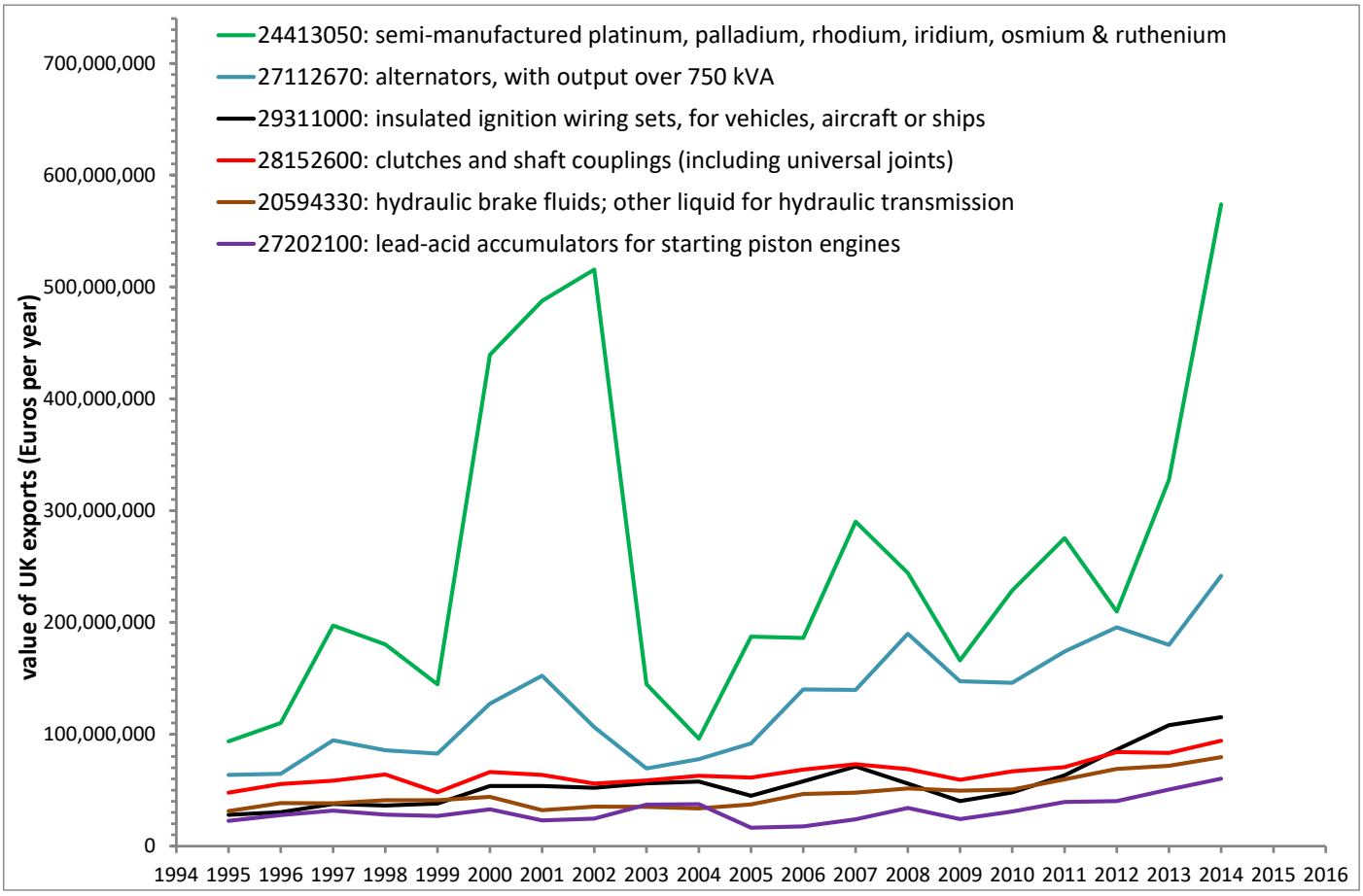


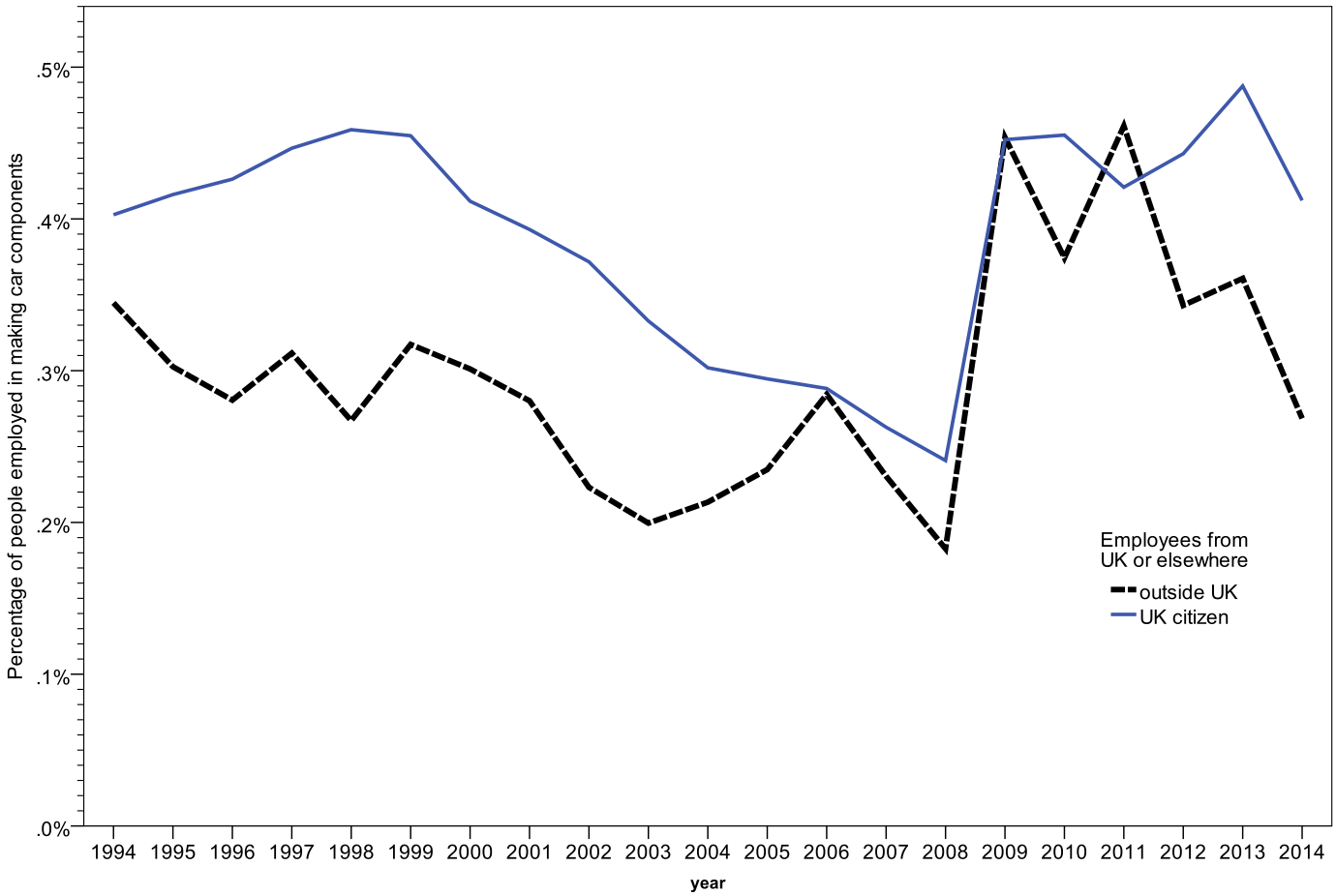
Chart 4 shows a general tendency for growth in exports of car parts from the UK (to all other countries, not just the EU). Many other types of car parts are made in UK and exported; not all of them show a trend of increasing value since 1995. But the six examples in Chart 4 help us make sense of UK exports of car parts, by giving specific examples of the type of components included in Charts 1 to 3. The following discussion turns to employment, an important influence on UK economic progress.

Table 1: selected series of industries relevant to car components, SIC 1992 and SIC 2007

SIC 1992		**SIC 2007**	
code	***description***	***code***	***Description***
25.11	Manufacture of rubber tyres, etc.	22.11	Manufacture of rubber tyres and tubes; retreading & rebuilding of rubber tyres
29.121	Manufacture of pumps	28.12	Manufacture of fluid power equipment
29.13	Manufacture of taps and valves		
29.14	Manufacture of bearings, gears, etc.	28.15	Manufacture of bearings, gears, gearing and driving elements
31.40	Manufacture of electric batteries	27.20	Manufacture of batteries and accumulators
31.50	Manufacture of lighting equipment	27.40	Manufacture of electric lighting equipment
31.61	Manufacture of other electric equipment for engines/vehicles	29.31	Manufacture of electrical and electronic equipment for motor vehicles
34.30	Manufacture of motor vehicle parts etc.	29.32	Manufacture of other parts and accessories for motor vehicles

Chart 5, and Table 1, are both based on data from the UK Quarterly 'Labour Force Survey' (LFS), a large nationally-representative household survey carried out by the UK government. SIC 1992 labels in Table 1 are from the SPSS data file of LFS surveys, provided by the UK Data Service in association with the UK Data Archive; SIC 2007 labels are from UK Data Archive (2007). Table 1 refers to employment of people living in UK who are employed in industries which (in the opinion of this author) are relevant to the exports of car parts from UK. The industry (which each employee worked in) is reported using the SIC 1992 classification, in LFS surveys from 1994; but LFS later adopted SIC 2007 for surveys from 2009. SIC 1992 definitions are not entirely comparable with SIC 2007, as reported in ONS (2015). There are other complications associated with the industries shown in Table 1: some of the categories (such as lighting equipment: 31.50 in SIC 1992, and 27.40 in SIC 2007) includes car-related products such as headlamps, but also include non-car-related products such as light fittings for homes. Even for the categories which are explicitly for vehicles (such as the bottom row in Table 1), only a fraction of the goods are exported – it is not clear **what** fraction of each row in Table 1 are used within UK. Hence, Chart 5 – which is based on LFS data, and is influenced by the above assumptions – should be considered as only an approximation of UK jobs in manufacturing car components.

Chart 5: fraction of UK employees employed to manufacture car components, by year and citizenship



Source: LFS (author's analysis)

To clarify Chart 5, it may be helpful to compare it with Charts 1 to 4 in this paper. Charts 4 and 5 use annual data, unlike Charts 1 to 3 (which use monthly data). In addition, Charts 1 to 3 focus only on three countries (Germany, France and Italy), whereas Chart 4 refers to exports to all European Union countries (except UK); and Chart 5 is an attempt by the author to assess exports from UK to all other countries – not just EU. Despite these complications, there seem to be some shared patterns: each of these 5 Charts in this paper is consistent with an increase in car component exports from UK to other EU countries from 1994 to about 2000, then a fall to about 2008-9, followed by an increase since 2009.

Having placed Chart 5 in historical context, we can consider the two lines in Chart 5. The solid blue line is for UK employees, who were born in UK and have UK nationality (based on LFS variables such as cryox7 and natox7: the variables differ between 1994 and 2014 surveys). The dashed line in Chart 5 shows people born outside UK, or who are not UK citizens (or both). Many employees are from outside UK; this may indicate that UK employers need to hire engineers and scientists with knowledge of languages other than English, to communicate with car manufacturers in countries such as Germany, France, and Italy. LFS data do not allow us to test this idea: as far as the author is aware, no LFS surveys ask the respondents which languages they speak. But if many UK employers are reliant on sales to countries where English is not the first language (as Charts 1 to 3 suggest), it seems appropriate for many UK-based firms to hire a fraction of their skilled staff to be able to communicate in languages other than English. In complex supply chains, "it is difficult to balance the needs of the purchaser companies and suppliers. Evaluation and measurement activities are critical factors" (Sarı, Baynal & Ergül, 2016: 62-3). We can imagine a German-speaking car designer in Germany might need to ask details of a UK-based engineer making car components (such as the operating temperature of a UK-made engine). This task is made easier by the European Union's

standardisation of many aspects of car design: “Technical harmonisation in the EU is based on the Whole Vehicle Type-Approval System (WVTA). Under the WVTA, a manufacturer can obtain certification for a vehicle type in one EU country and then market it EU-wide without the need for further tests. This system significantly contributes to the completion of single market in automotive products” (European Commission, 2016). An example is catalytic converters for car exhausts (Bosteels & Searles, 2002); higher standards are not entirely a result of EU intervention – some adoption of catalytic converters has been voluntary response to consumer preferences, such as French firm Peugeot Citroën in 1999 (Cames & Helmers, 2013: 8).

Sarı, Baynal & Ergül (2016) explain that each manufacturer must produce competitively-priced and sufficiently high-quality products, to satisfy customers; hence, each firm must seek the best supplier of components. UK success in exporting car components to countries such as Germany shows that UK firms are good at producing such components.

Conclusion

KPMG (2014) report that “The automotive industry accounts for 4% of GDP (£60.5 billion) and currently provides employment for more than 700,000 people in the UK”. Many readers may consider UK to be a rival to other EU countries, as regards car sales: every car made in Germany, France or Italy seems like a loss to British exports. This is partly true: UK will only export cars if manufacturers continue making cars of sufficient quality and value-for-money to compete with other countries. But many cars made in EU countries (including Germany, France, and Italy) include UK-made components, such as engines; hence, Britons have a reason to celebrate successful car manufacture in all EU countries.

Łazowski (2016) warns of an uncertain future, if UK were to leave EU in 2016. This paper confirms this impression: Brexit might be very harmful to UK. In particular, many UK jobs appear to be dependent on exporting to other EU countries: this paper focuses on car parts, but the UK manufacture of wings for the European Airbus shows that cars are not the only example where UK collaboration with other EU countries is effective.

This paper discusses ‘value chains’ in car manufacture, which link manufacturing in UK factories to consumption by EU consumers. The EU supports economic growth in various ways, such as a ‘level playing field’ for firms to compete; a large market of relatively rich consumers; and standardisation, such as catalytic converters. It is not clear (from evidence in this paper) why UK is thriving in the EU: more research is desirable. But UK benefits from ‘value chains’ which allow every firm with specialist expertise to sell; and EU benefits from meritocracy, in which a consumer has more choice. We can hope that scientists & engineers will continue to raise our standard of living.

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